

The work is a perfect model of descriptive or systematic botany, combining a true sense of proportion, the authors' well-known grasp of their subject enabling them to deal primarily with the material under investigation, and, secondly, with the book phase of the subject known as synonymy.

Seven beautifully executed plates elucidate the text.

Trees: a Handbook of Forest-Botany for the Woodlands and the Laboratory. Vol. iv. Fruits. By the late Prof. H. Marshall Ward. Pp. iv+161. (Cambridge: University Press, 1908.) Price 4s. 6d. net.

It was the intention of the author to complete this work in six volumes, but unhappily he was not spared to see the scheme accomplished. However, three excellent volumes, full of useful and interesting information, dealing respectively with buds, leaves, and flowers, had been published, and the author left behind sufficient manuscript for two other volumes. Prof. Groom undertook the task to see these two volumes through the press. A perusal of the present volume shows that the manuscript could not have fallen into better hands. The skill with which he has edited this part leaves nothing to be desired. Like its predecessors, vol. iv. is divided into two sections—a general and a special. The first section contains seven chapters. The first chapter gives an idea of what fruit is, its function and parts. In the second chapter is given a classification of fruits, and the remaining chapters of this section deal with the fruits of woody plants, each under its own natural order. In section ii. we have a tabular classification of trees and shrubs according to their fruits and seeds.

The many excellent illustrations given throughout the volume serve to enhance its value as a book for students and others who may wish to study fruits, and it will also be found of service for the purpose of reference.

The next and final volume is already in the press, and when issued will complete a monumental work on trees written by an enthusiast as only one who is imbued with the love of his subject can write.

"Trees," by Prof. Marshall Ward, will be found of use to the expert and student alike, while the beginner who has once started to read will soon find himself becoming enthusiastic under the inspiring influence of the writer.

A complete index has been compiled for this as well as for the other volumes by Mrs. Marshall Ward.

The Story of Iron and Steel. By J. Russell Smith. Pp. xi+193. (London: Appleton and Co., 1908.) Price 2s. 6d. net.

To all who are interested in the gradual development of our great iron industries, and especially the more recent development in America, this little volume may be of some interest. It, however, can hardly be said that the author has succeeded in carrying out the object he had in view, as stated in his preface, of presenting to intelligent persons a clear and concise description of the complex technical phenomena of iron- and steel-making. The author's apparent lack of detail technical knowledge has prevented his emphasising in his descriptions the fundamental principles involved in the various processes to which he refers. Thus, in dealing with the reduction of iron as it was practised during the various stages of development in passing from the catalan forge to the modern blast furnace, there is not the slightest suggestion made that there is any chemical reaction between the iron ores and the fuel

employed, and the lay reader would go away with the impression that the only function of the carbon, in whatever form it was used, was to act as a heating agent.

On p. 99, in dealing with the quality of iron produced, he makes the statement that if the iron is melted at 800° centigrade, it will contain 1 per cent. of silicon, which is, of course, an absurdity, as this temperature is below the melting point of iron. A page or two further on he speaks of the hot blast being injected into the furnace at 800° or 1100° centigrade.

His description of the puddling furnace is of the crudest when he speaks of the carbon in the pig-iron being combustible and gradually burnt out by the flame, while no suggestion is made that the real oxidising agent is the oxide of iron added. In chapter xi., "On the New Steels and their Significance," in which he refers to various alloy-steels, he seems to be under the impression that the self-hardening properties of high-grade steel tools are a function of their melting points, and his statement as to certain influences of manganese on steel certainly has the single advantage of being distinctly novel.

It is to be regretted that the technical descriptions in this little volume are so inaccurate, as in other respects it is a very interesting synopsis of the progress of the iron and steel industry. Perhaps the most interesting portions of the book are those chapters dealing with the various causes which have influenced the great developments in recent years in America, and also induced the rise and growth of the great financial trusts that now so largely control steel manufacture in the States.

Physiological and Medical Observations among the Indians of South-western United States and Northern Mexico. By Aleš Hrdlička. Pp. ix+460. (Washington: Government Printing Office, 1908.)

THIS publication is a bulletin of the Bureau of American Ethnology (Smithsonian Institution), and comprises the result of observations among a large number of Indian tribes. It will prove a mine of useful information to those interested in anthropology, but, like the publications of most Government institutions, is hardly written in a manner to make it interesting to the general reader. It contains, for instance, nearly 200 pages of statistical tables. Its title—physiological and medical observations—is justified because the data collected include what is so often missing in books on ethnology, details not only of size, stature, date of puberty, rate of pulse, muscular development, and so forth, but also statistics relating to prevalent diseases and native methods of treatment. Not the least attractive feature of the work is a series of twenty-eight beautiful plates, which illustrate the physiognomy and dwellings of the native races, as well as other points interesting to those who study folk-lore.

The author appears to have spared no pains in carrying out his investigations.

Ernst Haeckel. Versuch einer Chronik seines Lebens und Wirkens. By Prof. Walther May. Pp. vii+301. (Leipzig: J. A. Barth, 1909.) Price 5'60 marks; bound, 6'60 marks.

THERE are already two biographies of Haeckel, but Prof. May's book is complementary to these, and written in a different mood. It aims at showing what the great naturalist has accomplished, from his first research in 1855 to the institution of the Phyletic Museum in 1907. The author gives a careful account of the chief results of Haeckel's books,

including the "Generelle Morphologie," and shows us—rather by a statement of facts than by any formal estimate—the influence Haeckel has had on modern biology and on the intellectual outlook generally. He does not hesitate to quote the hardest things that have been said of Haeckel's physics and metaphysics, and even of his biology, but he gives us something of the defence as well. The quotations from irresponsible authors might have been left out, as well as all the verses from "Jugend," "Kladderadatsch," and the like, which seem out of keeping with the serious character of the book. It is a restrained and careful piece of work, tending, perhaps, to exaggerate the importance of Haeckel's later writings, but marked by unusual objectivity and impartiality of statement. There is an excellent bibliography.

Ventilation for Dwellings, Rural Schools and Stables. By F. H. King. Pp. iv+128. (Madison, Wis.: Published by the Author, 1908.) Price 75 cents.

PROF. KING knows the value of experimental demonstration in explaining scientific principles, and makes excellent use of it in his little book. The interesting treatment of the facts upon which successful ventilation depends, and the application of theoretical conclusions to practical problems, should make the book useful to a wide circle of readers. The supply of pure air is of vital importance in all the circumstances with which the book is concerned, and the volume may be commended specially to parents, teachers, and stock owners.

LETTERS TO THE EDITOR.

[The Editor does not hold himself responsible for opinions expressed by his correspondents. Neither can he undertake to return, or to correspond with the writers of, rejected manuscripts intended for this or any other part of NATURE. No notice is taken of anonymous communications.]

Temperature of the Upper Atmosphere.

SINCE my letters which appeared in NATURE on March 12 and July 30, 1908, you have published various communications on this subject. In your issue of March 18, p. 68, Mr. E. Gold contributes a mathematical calculation of the possible size of the difference between the temperature of the surrounding air and that of the balloon or the thermometer. His conclusion, if I rightly understand him, is that under the conditions which he postulates it is impossible for a thermometer of the Hergesell pattern to differ from the temperature of the surrounding air by sensibly more than 2°C .

In my last letter I specified actual cases in which differences larger than 2°C . had been observed between two thermometers of different types sent up with the same balloon, on occasions when a comparison of falling and rising readings seemed to show the impossibility of explaining this by mere errors of graduation. The causes which Mr. Gold investigates would naturally affect the two thermometers in the same direction, so that the difference between them is presumably an underestimate—possibly a large underestimate—of the disturbing influences exerted on the thermometer most affected. This does not, of course, necessarily invalidate the accuracy of Mr. Gold's work, because the conditions which he postulates may have been violated during the ascents in question; but I have no reason to suppose that I hit upon ascents which could reasonably be regarded as of a wholly exceptional character at the stations concerned. Out of the considerable number of records which I examined, there were only a few which gave data from two thermometers, and there seems no reason to suppose that the physical conditions on these

occasions were exceptional. Considering the many uncertainties in the physical data available at present, I am afraid that any mathematical calculation must be received with considerable reserve so far as practical applications are concerned.

I am glad to see, both from his letter and from a recent paper in the Proceedings of the Royal Society, that Mr. Gold prefers to speak of an isothermal region rather than of an isothermal layer; but I would invite him and other active meteorologists to take yet a second step, and discard the term *isothermal*. What the instruments usually suggest—rightly or wrongly—is, as I pointed out before, not uniformity in temperature, but an inversion of temperature. It is surely ridiculous to apply the term *isothermal* to the phenomena observed at Uccle on July 25, 1907, during the highest ascent yet effected (*Meteorologische Zeitschrift*, February, p. 88). During the ascent temperature fell from $+13^{\circ}\cdot5\text{C}$. at 360 metres to $-56^{\circ}\cdot8$ at 12,112 metres. Then came, according to the records, an inversion, temperature rising until at 26,557 metres, the greatest height attained, it was $-42^{\circ}\cdot3$, or $14^{\circ}\cdot3\text{C}$. above the minimum. The temperatures recorded during the fall agreed remarkably with those recorded at the same heights during the ascent, thus affording—as is pointed out in the *Meteorologische Zeitschrift*—strong support to the view that the ventilation was throughout sufficient. It is surely a misuse of words to apply the term *isothermal* to a region of which different portions—according to the only evidence available—differ in temperature by at least $14^{\circ}\cdot3\text{C}$. The records from some ascents even raise doubts as to whether, above the height of inversion, the temperature gradient is always and everywhere very small. The Uccle record above referred to showed a rise of 6°C . during the ascent from 12,112 metres to 13,000 metres, and a fall of $5^{\circ}\cdot6\text{C}$. during the descent from 13,000 metres to 12,000 metres.

C. CHREE.

March 20.

The Encouragement of Research.

I TRUST that you will permit an appeal to be made to those of your readers who believe that the encouragement of scientific research is a matter of national as well as of local importance.

The new buildings erected by the council of this college in the Cathays Park, Cardiff, are now approaching completion, and a special feature of those buildings is a laboratory dedicated wholly to the purposes of scientific research.

The erection of the whole of the new college buildings, according to the designs of Mr. Caroe, would involve an outlay of close upon 250,000l. The council has not considered it possible, at the present time, to undertake such an expenditure, but has sanctioned the completion of the buildings assigned to the arts, the administrative and the educational departments, the library, and the research laboratory. The erection and equipment of this portion of the buildings involves an expenditure of nearly 140,000l., of which about 100,000l. has been secured. A special and strenuous effort is now being made to raise from local sources the 40,000l. immediately required.

In such circumstances it is felt that any attempt to secure in this district, at the present time, the amount necessary for the equipment and modest endowment of the research laboratory might react injuriously upon the prospects of the special effort to which reference has already been made.

I venture, therefore, to appeal to those of your readers who, although not directly interested in educational matters in this district, feel that the encouragement of research is a national duty, to assist the movement for obtaining the necessary equipment for the suitable and handsome edifice which is being provided by local generosity and dedicated by the council of the college to the purposes of scientific investigation.

A collection of physical apparatus has already been presented to the laboratory, but as it is of a somewhat specialised nature it can only be regarded as a nucleus.

All donations received in answer to this appeal will be devoted solely to the equipment and upkeep of the research